

WHAT IS CLAIMED IS:

1           1.     A cleaning system adapted for cleaning semiconductor processing  
2 equipment, said cleaning system comprising:

3                 a remote dissociator coupled to said equipment by a transport mechanism;  
4                 a local dissociator integrally related to said equipment; and  
5                 a precursor disposed in said remote dissociator;

6                 wherein said remote dissociator is operable to dissociate said precursor to  
7 create a first plurality of cleaning radicals, said cleaning radicals entering said transport  
8 mechanism, a first portion of said cleaning radicals entering said equipment and a second  
9 portion of said cleaning radicals recombining to create a plurality of less reactive  
10 elements in said transport mechanism, said less reactive elements entering said  
11 equipment, and said local dissociator operable to dissociate a portion of said less reactive  
12 elements to create a second plurality of cleaning radicals.

1           2.     The cleaning system of claim 1 further comprising an optical  
2 endpoint detector, wherein said detector indicates completion of a cleaning of said  
3 equipment.

1           3.     The cleaning system of claim 1, wherein said remote dissociator  
2 provides a greater than 75% dissociation efficiency, whereby PFCs in an exhaust from  
3 said cleaning system are reduced.

1           4.     The cleaning system of claim 1, wherein said first portion of said  
2 cleaning radicals is less than said second portion of said cleaning radicals.

1           5.     The cleaning system of claim 1, wherein said second plurality of  
2 cleaning radicals includes ions.

1           6.     The cleaning system of claim 5, wherein said cleaning radicals  
2 include at least one of: Cl, F, Cl ions, or F ions.

1           7.     A method of cleaning a semiconductor processing equipment, said  
2 method comprising:

3                 introducing a precursor to a dissociator;

4                 dissociating said precursor to create a first plurality of radicals;

5 introducing a first plurality of said first plurality of radicals to said  
6 equipment, a second portion of said first plurality of radicals re-associating to create less  
7 reactive elements;

8 introducing said less reactive elements to said equipment; and  
9 dissociating said less reactive elements to form a second plurality of  
10 radicals in said equipment.

1 8. The method of claim 7, wherein said dissociating said precursor  
2 provides at least 75% dissociation efficiency, whereby PFCs in an exhaust from said  
3 system equipment are reduced.

1 9. The method of claim 7, wherein said second portion of said first  
2 plurality of radicals is greater than said first portion of said first plurality of radicals.

1 10. The method of claim 9, wherein said precursor comprises a  
2 flourinated species capable of supplying atomic flourine.

1 11. The method of claim 7, wherein said second plurality of radicals  
2 includes cleaning ions.

1 12. The method of claim 11, wherein said cleaning ions include at least  
2 one of F ions or Cl ions.

1 13. The method of claim 7, wherein said dissociating said less reactive  
2 elements creates physical sputtering.

1 14. The method of claim 7, wherein said less reactive elements include  
2 at least one of F<sub>2</sub> or Cl<sub>2</sub>.

1 15. The method of claim 7, further comprising: ~~introducing a second~~  
2 precursor to said equipment.

1 16. The method of claim 15, wherein said second precursor comprises  
2 oxygen.

1 17. The method of claim 16, wherein said oxygen combines with  
2 carbon on said equipment to form CO<sub>y</sub>.

1 18. A method of cleaning a semiconductor processing equipment, said  
2 method comprising:

3 introducing a first precursor to a remote dissociator;  
4 dissociating said first precursor to create a first plurality of radicals;  
5 introducing said first plurality of radicals to said equipment;  
6 introducing a second precursor to said remote dissociator;  
7 dissociating said second precursor to create a second plurality of radicals;  
8 introducing a first portion of said second plurality of radicals to said  
9 equipment, a second portion of said second plurality of radicals re-associating to create  
10 less reactive elements;  
11 introducing said less reactive elements to said equipment; and  
12 dissociating said less reactive elements to form a third plurality of radicals  
13 in said equipment.

1 19. The method of claim 18, wherein said third plurality of radicals  
2 comprise Cl and said first plurality of radicals comprise F.

1 20. The method of claim 18, wherein said dissociating said first  
2 precursor includes forming a first plasma and said dissociating said less reactive elements  
3 includes forming a second plasma.

1 21. A semiconductor equipment cleaning system comprising:  
2 a housing;  
3 a remote dissociator configured to dissociate a first gas remote from said  
4 housing, said dissociation forming a second gas;  
5 a gas delivery system to introduce a portion of said first gas, a portion of  
6 said second gas, and a re-associated portion of said second gas into said housing.  
7 a local dissociator configured to dissociate said re-associated portion of  
8 said second gas;  
9 a controller for controlling said remote dissociator, said gas delivery  
10 system, and said local dissociator; and  
11 a memory coupled to said controller, said memory comprising a computer-  
12 readable medium having a computer-readable program embodied therein for directing

13 operation of said semiconductor cleaning system, said computer-readable program  
14 comprising:

15 an instruction to control said remote dissociator;  
16 an instruction to control said gas delivery system; and  
17 an instruction to control said local dissociator.

1 22. A computer-readable storage medium having a computer-readable  
2 program embodied therein for directing operation of a semiconductor cleaning system,  
3 said semiconductor cleaning system comprising an equipment, a remote dissociator, a  
4 local dissociator, and a gas delivery system configured to introduce a gas from said  
5 remote dissociator into said equipment, said computer-readable program including  
6 instructions for operating said semiconductor cleaning system in accordance with the  
7 following:

8 introducing a precursor to said remote dissociator;  
9 dissociating said precursor to create a first plurality of radicals;  
10 introducing a first portion of said first plurality of radicals to said  
11 equipment by way of said gas delivery system, a second portion of said first plurality of  
12 radicals re-associating to create less reactive elements;  
13 introducing said less reactive elements to said equipment by way of said  
14 gas delivery system; and  
15 dissociating said less reactive elements to form a second plurality of  
16 radicals in said equipment.